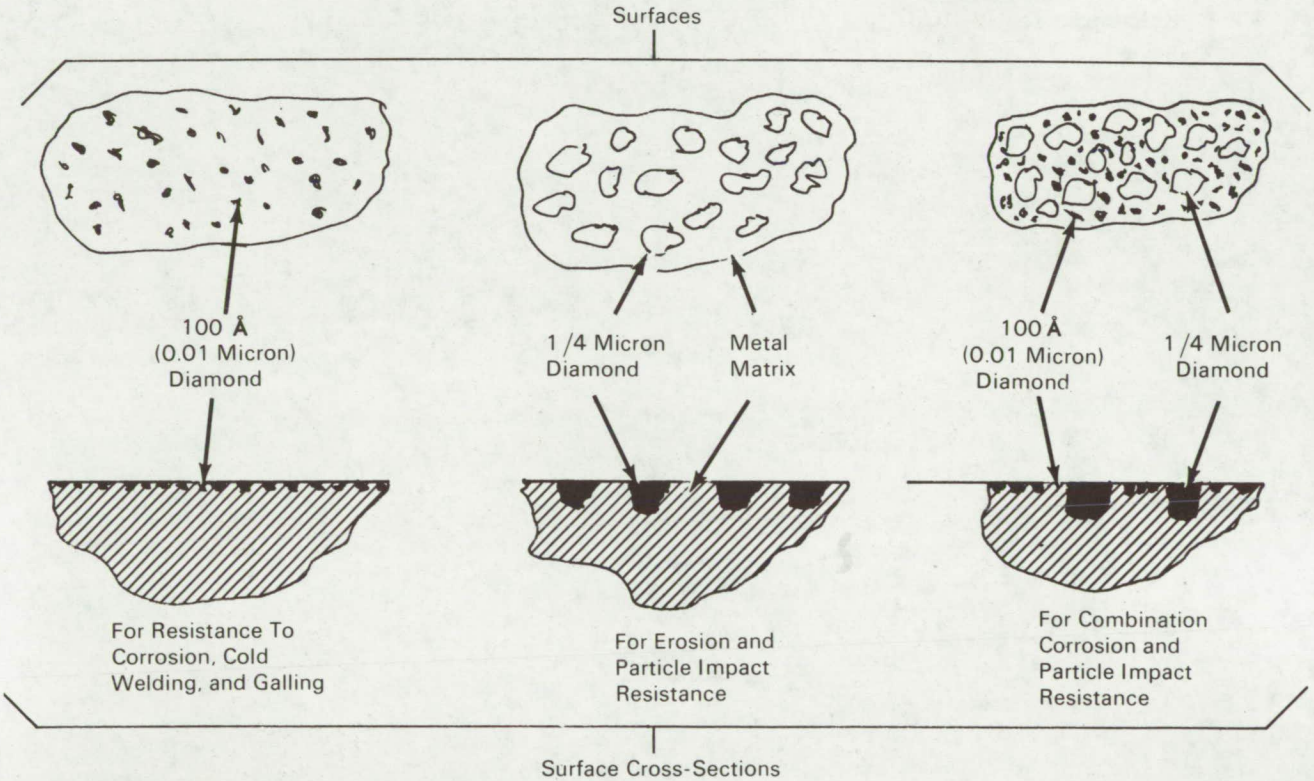
NASA TECH BRIEF

Surface Treatment for Valve Seats



A valve with greatly increased resistance to galling, corrosion, erosion, and cold welding has been produced by embedding fine particles of diamond in the metal surface of the valve seat. This treatment, which has greatly improved the reliability and lifetime of the valve, may be used with a wide variety of metals in many different applications.

A newly available ultra-fine diamond powder having an average particle diameter of 0.01 micron is used, together with a standard fine diamond polishing compound having an average particle diameter of 0.25 micron. The powder may be used plain or suspended in a grease vehicle of the type generally used with lapping compounds.

The diamond powder is embedded in the metal surface mechanically, by spreading the powder on the surface and applying pressure. When treating valve seats, it has been found advantageous to use a hardened ball of sapphire or sintered carbide the same shape as the ball used to lap the valve seat. The ball is brush coated with the diamond compound, set in place in the valve seat, and pressed or tapped re-

(continued overleaf)

peatedly to embed the diamond particles. This technique may be used with diamond particles up to about 45 microns in diameter.

A surface treated with the ultra-fine diamond powder shows increased resistance to corrosion, galling and cold welding; treated with the larger particles it shows increased resistance to erosion and particle impact damage. Sequential treatment with both sizes of particles can produce a surface with an optimum combination of both sets of properties.

Note:

Requests for further information may be directed to:

Technology Utilization Officer
NASA Pasadena Office
4800 Oak Grove Drive
Pasadena, California 91103
Reference: TSP70-10202

Patent status:

This invention is owned by NASA, and a patent application has been filed. Royalty-free, nonexclusive licenses for its commercial use will be granted by NASA. Inquiries concerning license rights should be made to NASA, Code GP, Washington, D.C. 20546.

Source: W. F. MacGlashan, Jr. of
Caltech/JPL
under contract to
NASA Pasadena Office
(NPO-10779)